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Author

Mayorga, Sara A

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DIGITAL DISRUPTIONS: AN ANALYSIS OF TECHNOLOGICAL IMPACT ON STUDENT ENGAGEMENT IN THE CLASSROOM

By

Sara A. Mayorga

A capstone project submitted for Graduation with University Honors

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APPROVED

Dr. Rebekah Richert
Department of Psychology

Dr. Richard Cardullo, Howard H Hays Jr. Chair
University Honors

ABSTRACT

Learning new skills and information can be one of the most time-consuming actions to engage in. Students can be considered the biggest contributor to this. It is very vital for schools to ensure that students are receiving the right tools to successfully motivate and further their studies. This study has been designed to measure the effects of technology that students are being exposed to within K-12 level classrooms and whether it affects the student's willingness to participate and ability to learn topics being taught in their respective grade level. The method of research consisted of six interviews with teachers who are first-hand observing the effects technology exposure has had on their students and whether improvements or disadvantages are being experienced by these students. The teachers who were interviewed are from a variety of schools within the Inland Empire of California to better understand the effects of technology integration across all content areas and analyze how educators are contributing to a student's ability to learn new curriculum. These interviews consist of personal experiences from teachers where successes and setbacks have been observed, analyzing different types of technology used in their classrooms, and whether they feel they received sufficient training to guide their 'scholars' to success. Readers of this study will be able to better comprehend the benefits and any effects take-home laptops, tablets, uses for online websites and further tech has had on the students of today.

Keywords: Technology, Student participation, K-12, Learning styles/modes.

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INTRODUCTION

The ability to pursue and receive an education, whether from the K-12 setting or through higher education, is a true gift. Many children do not have this privilege for various reasons, one being where they are in the world. According to Paul Glewwe and Michael Kremer (2006) in their book *Handbook of the economics of education*, "About 80% of the world's children live in developing countries" (Glewwe & Kremer, 2006, Abstract) and therefore cannot receive free and appropriate education due to it simply not being available for them. And when opportunity arises for these children to start learning in a school, they "still leave school at a young age and often learn little while in school" (Glewwe & Kremer, 2006, Abstract). For this reason, it is important that we scrutinize and make changes in the realm of education where appropriate while also keeping a student's future in mind. This is especially vital when unforeseen circumstances cause drastic measures to be taken and therefore cause a disruption to a child's education.

Beginning in March of the year 2020, students were informed that school would be excused for about two weeks to gauge the effects the COVID-19 virus would have on affected individuals. It was then determined that students would need to be removed from the school setting for far longer until this detrimental virus's spread slowed down. This turn of events was the direct cause of the creation of "online instruction" which focused on giving students as much of a quality education as possible while not being present within the school setting. Unfortunately, this pause in education took longer than a couple weeks and totaled about 2 years in length where students were forced to utilize this online method of learning in order to continue their educational experience. While some students enjoyed this different type of learning, many students and parents raised concerns with the quality education they were receiving and whether it would help them in the long run as they continued forward into their adult life.

Technology has slowly, but surely, made its way into student's lives and taken over the way they conduct their daily routines. Cellphone usage and laptop usage they engage in to complete different assignments are just some of the ways these students are being pushed toward introducing technology further into their lives. The term that is used to refer to the amount of time individuals are using electronics throughout their day is known as 'screen time' and it often used to measure the amount of developmentally appropriate use for those who utilize technology. But, according to Lindsay Daugherty et al. (2014) in 'Moving beyond screen time: Redefining developmentally appropriate technology use in early childhood education', "Using screen time as the primary measure of developmentally appropriate use has become increasingly inappropriate, as new technologies are ever more rapidly introduced and integrated into all aspects of life"(Daugherty et al., 2014, p. 1). Whether this extra screen time that students are engaging in has a mild to moderate effect on their educational performance and overall engagement within the classroom setting, is the question this study was created to assist educators in answering parents and students who are concerned with or curious about the increased amounts of technology that are being implemented into each classroom's daily lessons.

For the purpose of the current study, qualitative interviews were conducted with six different educators who each teach different subjects and grade levels to understand the difference in technological device disbursement within each respective school, what feedback they have observed and heard from their students regarding more technological use during their daily lessons, and their professional opinion on whether technology should be 'here to stay', abolished and done away with, or if a middle ground should be reached to keep student's tech skills afloat. This study serves as an informational guide for parents and educators to read through and decide what their opinion is on this new integration of technology with K-12

classrooms. This study also reviews and discusses various research papers and studies conducted by researchers in the areas of education and technology to describe and build an understanding on the findings these researchers were able to conclude from their studies.

LITERATURE REVIEW

The idea that education is not ‘one size’ is a prominent theme that is highlighted several times across the vast selection of literature pieces reviewed by the primary researcher in preparation for this study. It is common knowledge that each individual student learns and retains information taught to them by educators in a different manner and need different or various supports in order to retain and apply this newfound information. This phenomenon is known by the concept of “learning style(s)”, which is defined as “the way in which each learner begins to concentrate on, process, absorb, and retain new and difficult information (Pashler et al., 2008, p. 107). The reliability on the existence of this phenomenon is constantly deliberated by experts in the educational field in which they argue that students do not actually have a learning mode that best benefits their learning process. To elaborate more on learning styles, there are three widely known and recognized categories that a student can fall under one or more. They are known as, ‘Visual learner’, ‘Auditory learner’, and ‘kinesthetic or sensory learner’(Gordon, 2010, P. 6). **“**Identifying learning styles” explains that visual learners are learners who use pictures, diagrams, and/or demonstrations, auditory learners are learners who use words and sounds, and kinesthetic/sensory learners are learners who use sights, sounds, and physical sensations to cognitively retain any learned information (Gordon, 2010, p. 6). These categories have merely been deemed as urban legends that children have no part in (Riener & Willingham, 2010) but upon reflecting on each student’s performance, according to teachers, and the fact that when students are offered different perspectives to look at their learning through, their issues with retaining new information have been found to be resolved upon choosing a new method of cognitive learning.

The topic of ‘screentime’ and what it encompasses was very influential to the primary researcher while they looked through potential effects of increased technology in the classroom. In previous years, young children were minimally utilizing technology and engaging in ‘screentime’ mostly through electronics at home or with friends/family. Now that these students are utilizing technological mediums such as laptops, tablets, and cellphones within instructional time, their technical screentime is going through the roof and exploding (DiMartino, Shultz, 2020). Lindsay Daugherty and fellow collaborators (2014) discuss what screentime is and what has been established as an appropriate screen time for individuals in their article titled, “Moving beyond screen time: Redefining developmentally appropriate technology use in early childhood education”. They state that, “In 1999, the American Academy of Pediatrics (AAP) recommended that screen time be limited to two hours a day for children over age two, and that no screen time be allowed for children younger than that” (Daugherty, et. al., 2014, p. 3). They reiterate that this guideline created by the AAP has not been changed since this introduction date and continues to be the standard for allotted screentime in technology-using individuals. Many parents also report not abiding by this suggestion and allow their children to use technology mediums for excessive amounts of time. So, the question remains: What technological mediums are considered “educational tools” and does excessive use only count when using entertainment mediums on these devices, or can excessive amounts of reading and homework also account for this?

Cellphone use and possession has increased tenfold in the last decade, where many argue, has created issues and disparities within children’s development and learning abilities (Domingues-Montanari, 2017). These issues that children are being faced with have been researched and linked to emotional and behavioral difficulties due to cellphone exposure at an early age. A study conducted by Madhuri Sudan (2016) and colleagues measures the credibility

behind the claim that prenatal and postnatal (up to age 7) exposure to cellphone use shows an increase in emotional and behavioral difficulties manifesting in children by age 11 and carrying on with them as they age. This study followed their chosen participants from before birth and utilized a questionnaire to collect data from over 96,000 chosen expectant mothers in Denmark from 1996-2002. The reason why this article relates to this study is due to the responses the primary researcher received from their participants who described the different behaviors present in their students, especially after transitioning from online instruction back to the in-person instruction model. “What happened during Covid, what happened when they came back, I had students the first year, when we came back, they sat together for 3 months, and they would not talk to each other. They would not know each other's names. They just did not want to interact at all” is a concern ‘anonymous 2’ shared with me during their interview, which they believe is due to the excessive cellphone and device use during the years of the COVID-19 pandemic. Again, we see here that there is a rising concern with early cellphone and technological use in children, which has been found to impact their learning and retention quality.

Another scholarly journal article that investigates this topic and describes different benefits and concerns educators have with early technology use is titled “The influence of young children’s use of technology on their learning: A review” by Ching-Ting Hsin, Ming-Chaun Li, and Chin-Ching Tsai (2014). Within the introduction, these authors introduce readers into what research has been done surrounding this topic and why it essential that research keeps being conducted to find a conclusive answer for this reoccurring question. An important question that they highlight here is whether educators, parents, and students alike, can agree if the technology-related practices are developmentally appropriate for these young children and whether they should be modified in a way that creates more of a positive impact on children. They suggest that

for educators to know whether these practices are being effectively used, they need to remember that they "play important roles in scaffolding young children's learning within the zone of proximal development [ZPD] (Bredekamp & Copple, 1997; Vygotsky, 1978)" (Hsin, et. al., 2014, p. 85). Many educators argue that students are not learning additional skills through this constant use of technology during times of instruction and therefore aren't tapping into a child's ZPD to increase their knowledge, but according to a researcher by the name Drew Polly (2011) this is not the case.

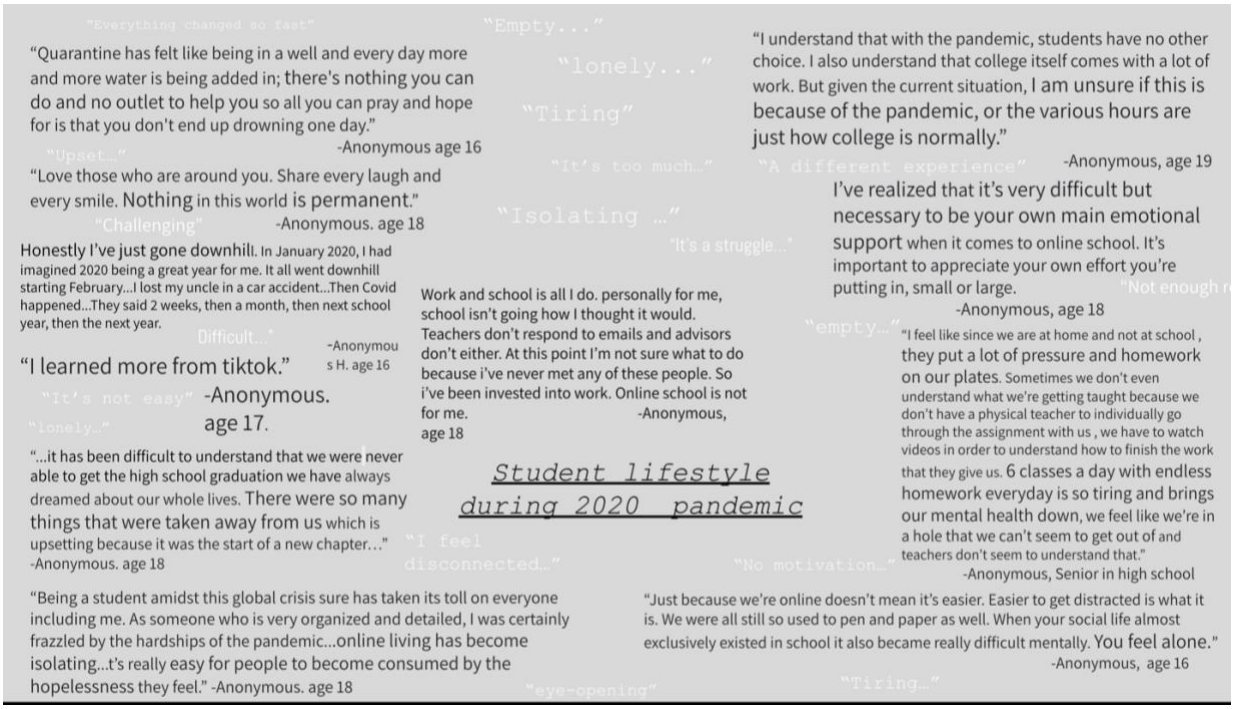
In "Developing students' higher-order thinking skills (HOTS) through technology-rich tasks; The influence of technological pedagogical and content knowledge (TPACK)", Polly claims, "Technology has been shown to positively influence student learning when students explore technology-rich tasks that simultaneously require them to use higher order thinking skills (HOTS)…" (Polly, 2011, p. 20). They continue elaborating and stating that these skills can look like analyzing/evaluating information to creating new representations of knowledge in more depth/detail than they would previously do without a technology-rich task to go along with the lesson. Anyone in the field of education can recall the Higher order thinking skills chart originally created by Benjamin Bloom (1956) in his book titled, *Taxonomy of educational objectives: The classification of educational goals.* Polly mentioned Bloom's taxonomy in this study and essentially states that through a technology-rich task, students are more easily moving from the lower levels of 'knowledge' and 'comprehension', up to levels such as 'application', 'analysis', 'syntheses, and 'evaluation' with this newfound information from their lessons. By teachers working to ensure that components such as 'relevancy', 'student-directed', 'reflective', 'facilitated', 'collaborative', and 'technology-rich', are found within their assigned tasks, students will be simultaneously working on academic information retention, and inclusively,

other important skills such as intrapersonal and interpersonal skills, communications skills, self-management skills, and higher order thinking skills. When this type of data is shared with educators, this creates the notion that most likely, technology integration is not the issue here that is creating learning and participation difficulties in children, but rather, it is the amount of time and purpose these children are utilizing it for.

As we move forward and recognize other factors that contributed to, and still do, to the rising use of technology within schools, we remember the impact the COVID-19 pandemic had on us all. The COVID-19 pandemic was an event in time that severely impacted educators, students, and parents alike due to factors such as increased financial burdens, losing loved ones to the virus, receiving online instruction, and causing individuals to learn how to isolate themselves from in-person human contact to detain the spread of the virus. The last two listed criteria mainly fit the student perspective as they were removed from the school setting and expected to adapt to online learning easily and efficiently to continue their education. The primary researcher was previously asked to conduct informal research and gather data on how high school students felt towards online instruction during the COVID-19 pandemic. Attached is figure from the google slides project with the data that was collected in 2020 via snowball recruitment and a google form that asked participants to fill out with any relevant information. All participant names were changed to 'anonymous' to keep all information confidential and unidentifiable.

Figure 1

Image: "*Student Lifestyle during 2020 pandemic"*



Reflecting upon this assignment, the primary researcher found that students were having a hard time with the task of online instruction while juggling between 5-6 classes, being involved in school affairs where possible, and maintaining their own self-identity. Because there was little training and support being offered to teachers due to this sudden pandemic, many students' educational journey or self-efficacy was challenged due to the increase in technological use for the purpose of online instruction (Ozerbas, Erdogan, 2016).

While many believe that technology is 'next best thing' and has dramatically helped our society shift in a positive direction, there are plenty of consequences that come with the integration of a system like this, especially in the realm of learning for children. The above articles and studies have helped the primary researcher and team understand and shape their reason to pursue studying the effects of technology within the K-12 classroom, as well as to create the predetermined interview questions and initial hypotheses below.

Guiding questions for interviews:

All participants who were interviewed for this study were asked a set of 5 predetermined questions created by the researcher and their faculty mentor that focused on the main idea of this study: technology and its newfound effect within their classroom. The following 5 questions were the predetermined questions asked during these six interviews:

1. Do you see technology within the classroom in the form of laptops, digital assignments, using videos and interactive websites, etc., as beneficial to your student's learning style?
2. Is this digital type of learning a more useful and approachable tool for yourself and students than when classrooms didn't rely so heavily on technology?
3. What indicators within your classroom have come forward that show progress in more participation/learning based on online lesson learning?
4. Are there any indicators that students aren't participating more often during class time because of a clash between their preferred learning styles and technology's place in the classroom?
5. Do you wish schools had more technology available for their students to utilize daily, or is it the opposite?

Based on their answers and any extra time they had available, extra questions were added to continue the flow of the conversation and better understand their shared points of view. Extra questions that were not predetermined prior to the interviews are as follows:

- ◊ Have you had a problem with cellphones in the classroom? If so, what problems have they caused? If not, how do you feel about them possibly affecting a student's performance in the classroom?
- ◊ What grade level and subject(s) do you teach?

Hypothesis

The primary researcher created two hypotheses based on the literature review they conducted and inclusively used this to help lead and steer the conversations with participants as they answered questions posed by the researcher.

- Technology should be kept at a minimum within the classroom setting and only utilized as necessary to refrain from student distractions and inappropriate use.
- Participants of this study will state they believe technology should be kept to minimal use and only brought out for student use as a reward for completing required assignments and being proactive with participating in class discussions.

METHODS

Participants

The participants that were recruited for this study include 6 educational instructors ranging from the 3rd grade level to the university level, all with different educational backgrounds and experiences that have shaped their instructing method. Because this study focuses solely on the K-12 setting, the university level instructor was recruited due to their experience with Special Education within the K-12 setting to receive further insight on how this recent integration of technology within the classroom is impacting all areas of education, including Special Education. All educators that were interviewed are instructors for either a variety of topics within a subject or teach multiple subjects to their students. The level of teaching experience within the individuals interviewed ranges from 1 year to 10 years.

Any participation from these instructors was done so voluntarily and were not offered any form of compensation from the primary researcher. These interviews were conducted through zoom and mainly at the convenience of the instructors to ensure they were able to participate without incurring fees from transportation or being absent from their occupation(s).

Procedures

Participants for this study were recruited through convenience and snowball sampling methods. All created methods for communication and information that was gathered for this study went through the "Institutional Review Board" (IRB) to gain approval to be conducted. An initial email was sent to personal contacts of the primary researcher, who are teachers. These individuals were invited to participate based on their eligibility in meeting specific criteria set by the primary researcher and their faculty mentor. The criteria required the participant population to be teachers of any age, gender, race, etc., with the restriction of speaking fluent English. Per

recommendations by Fugard and Potts (2015) on sample sizes for thematic analysis, the sample size was initially estimated to be between 10 and 20 teachers. However, the main researcher encountered many schedule blocks in interested teacher's schedules, which caused the actual participant population to drop down to 6 teachers to ensure that interviews and data analysis would be completed by March of 2024. These teachers were also invited to send the email to other educators they know who were interested in completing the interview, which is how a majority of the participating teachers were recruited.

These interviews lasted between 30 minutes and 60 minutes to ensure all comments made by participants were recorded and for participants to have ample time to think about and answer these questions during the time of the interview. The primary researcher used their personal Zoom link to hold these meetings and used the 'waiting room' feature in Zoom to ensure that only the primary researcher and the agreeing participant were the only ones in this virtual meeting. As an additional safeguard, the primary researcher used a [Virtual Private Network] VPN to ensure virtual safety during these recorded interviews and encouraged their participants to also utilize one on their personal device for the duration of the interview. Participants were also asked to keep their camera off for the entire interview and change their name to "Anonymous #" based on how many participants came before them. This naming method was also used to ensure that the primary researcher was able to give due credit and quote participating instructors in the results section of this study.

All data collected from these interviews was modified to remove all identifying information. Once this point was reached in the study, participants were no longer able to withdraw their given data because there was no way to indicate which collected data was specifically theirs.

RESULTS

For the current study, data were collected through interviews conducted by the primary researcher and volunteers who classified as educators at some point within the K-12 system. The primary researcher then looked back through the 6 interview transcripts created by the transcript software on Zoom and attempted to identify any reoccurring themes that were presented in all 6 transcripts. The following 6 themes were identified by the main researcher to be reoccurring and had an outstanding impact on the conversation during all interviews:

- Technology is useful when utilized correctly and within measure.
- Teachers do not receive enough or any training on how to utilize this technology.
- Younger children like to interact with their peers and adults in play and role play. Older children enjoy being on an electronical device.
- Each student learns differently, and it is vital that educators are aware of these various learning modes being present in their classrooms.
- Covid has been observed to have had an impact on student's attention spans and created issues with students willingly socializing with others after returning from online instruction.
- Technology should be available at every school and each student should at least be enrolled in a 1 to 1 tech allowance program.

Technology is useful when utilized correctly and within measure.

Many of the interviewed teachers expressed agreement with the above theme that was found in collected data. Anonymous 4 stated, "yes, I think they are very beneficial if used properly" during their interview upon being asked question 1. Anonymous 4 then elaborates on

their answer by bringing in the concept of learning styles and how it truly depends on the projected use of this technology. As a substitute teacher who has worked with students of all grade levels in the K-12 system, they were able to see just how vital technological use was in the classroom when they needed to elaborate on pre-taught lessons or sharing new lessons with their students. Anonymous 1 also expressed this same thought in their interview when they stated "Kids are gonna learn, I think, no matter what, you know, with technology. But I think teachers could still abuse it in a way, you know, they could still use it as a crutch. So, it just depends". It's essential for educators to understand that the use of technology within their classroom is just as much a privilege as an academic weapon. A majority of the participants expressed this in passing during their interviews, but during Anonymous 4's interview, the primary researcher was informed in depth of large-scale benefits that came from having these technological devices both at school and home: teachers being able to check in with students everywhere to ensure they are completing their work at home and receiving extra support whether they are present at school or need to be absent. Another participant who shared their story regarding benefits from increased technological use was Anonymous 2, when they mentioned,

> But now, after we start using more technology in the classroom. I found, that it's extremely important to have everything. Let's say we use Google classroom at my school. And if we are able to stream everything we're doing in the classroom, even when the students are gone, absent. They know what's going on in the classroom. They get all the work. They get all the notes, they get videos of how to do things.

One final interesting point made by Anonymous 5 regarding how useful this integration of technology within the classroom is, specifically discussed its role in Special Education. Many students in Special Education utilize AAC devices, also known as "Alternative Augmentative

Communication," which can range from picture cards all the way to devices that can pronounce full words and sentences for the user.

> when we're using technology, it allows us to do whole group instruction while accommodating for each individual's needs. And so you'll have some students using iPads to communicate. You'll have other students communicating verbally. And so that's where I've seen it be extremely important. And then again, when we're thinking about those centers and individual IEP goals, utilizing the computer or the iPad has been beneficial.

is part of the valuable feedback Anonymous 5 shared with the primary researcher when asked if they had observed any indicators of positive progress in their classroom(s) with this new integration of technology.

Teachers do not receive enough or any training on how to utilize this technology.

As the primary researcher conducted their interviews, they helped steer the conversation toward teacher trainings for integrated technological use within their classroom and received essentially the same feedback: there is little to no training specifically for how to use technological devices in the classroom, during lessons, and ways in which to keep students actively engaged in the learning process. Anonymous 3 shares in their interview, "You know what? Unfortunately, they don't... Like, you have teachers that are like, really unfortunately, aren't as tech savvy and they haven't yet figured out how to utilize these devices…No, we teachers are like figuring it out" when asked their thoughts about teacher trainings provided by their districts of employment. Anonymous 3 continues elaborating on their response by sharing that there are programs offered in terms of training for school staff, but they do not actively encourage teachers to take advantage of it. A program named "Everyone can create" is actively

implemented in their school district where Apple donates iPads to various classrooms for use during instruction so long as the teacher attends a training to know how to correctly utilize them. The issue with this though, as stated by Anonymous 3, is that the school district doesn't actively encourage their educators to take these opportunities or announce it to all, so they are aware of programs like these existing. It essentially is up to the teacher's discretion on whether they would like to take the time to go through these unpaid trainings for the sake of their students. Anonymous 2 shared in their interview, in regard to training, that during the first year of COVID when they had to turn to remote instruction,

> I learned in one year what I didn't in 10 years because we had the need of using more technology because we were not able to be in person. So that was an amazing year, because I was able to learn so so much new different websites and things that we could do with technology that I didn't even know they existed until then.

Due to this urgency of needed to learn how to wield technology responsibly in a classroom, they had to navigate this new territory with little room for error as a cause of not being previously prepared for a pandemic of this magnitude. Anonymous 1 shares a frustration in their interview by sharing,

> …and as a teacher I could, I could say a frustration would be, sometimes schools and districts will tell us, Hey, use this website, and then we use it. We put all our time and energy creating lessons on that website. And then the district moves away from that website.

Had these districts had a protocol lined up for when technology was beginning to get integrated into classrooms several years before, perhaps these teachers would've been better prepared and ready to tackle the new obstacle of online instruction from the very beginning.

Younger children like to interact with their peers and adults in play and role play. Older children enjoy being on an electronical device.

Another reoccurring theme that was uncovered through data analysis was the idea that there is a difference in preference for using electronical devices or being in the moment with peers and teachers. Anonymous 6 elaborates on their 3rd grade students' preference in their interview by sharing that,

> I think with the age group that I'm at, I think that they do enjoy also doing like a lot of paper pencil activities like the highlighters. They'll get excited to use just the regular highlighters to highlight on their paper as well on the computer…but for some of these… they're having a bit of an issue right like not understanding where we click here or how to delete a box right sometimes that could take away from the experience versus adding onto it.

Students at the age level tend to get more frustrated easily and do not necessarily know how to express these emotions in an appropriate and healthy manner, thus, manually completing assignments and being engaged in activities with peers and teachers is more favorable in children at this age.

On the other hand, Anonymous 2 shares in their interview of platforms they started utilizing with the increase of technology allowed in the classrooms known as 'Quizlet' and 'Kahoot'. As a Spanish and English teacher, Anonymous 2 wants their students to practice learned vocabulary when possible and has utilized extra time during class to do so and offers incentives for students who do well. "…we play the games to review and practice those conjugations to review vocabulary. So, in most cases the students are excited about playing the games, and the students are actually participating. They're able to improve their skills"

(Anonymous 2, 2024) was shared during their interview. With this, there have been some reported downsides though, such as not all students being willing to participate in the above activity, or being absent on days when this activity is conducted. Keeping this in mind, it's important that educators recognize the age groups they work with and how to correctly utilize this technology to increase participation and motivation within lessons.

Each student learns differently, and it is vital that educators are aware of these various learning modes being present in their classrooms.

The theme of learning styles and figuring out ways in which to engage all students to help them become successful in their educational endeavors was another prominent theme found to be apparent throughout the collected data. This theme was discovered to be rooted in the overall answers given by participants as they described the ways in which they conducted instruction in their classrooms. From utilizing music in the Spanish language to help with learning vocabulary in Anonymous 2's classroom to offering their students the option to complete assignments as paper worksheets or online activities in Anonymous 3's and 6's classrooms, teachers who can understand that each student has a different preferred learning mode can truly lead their pupils away from academic failure/frustration and instead toward success and motivation.

Covid has been observed to have had an impact on student's attention spans and created issues such as students willingly socializing with others after returning from online instruction.

Students and teachers who switched to online instruction for the remainder of the 2020 school year and '20-'21 school year know very well the feelings experienced during this sudden switch. Not only did they have to adapt to this new form of learning, but in-person events such as graduation ceremonies, dances, sports, and family events were also postponed for the time being to lower the COVID-19 contamination rate. Students turned to smartphone apps such as

YouTube, TikTok, Instagram, etc., for entertainment and ways to help them understand the material they were being taught during this era of online instruction since there was little teachers could do to truly support their students from home. Anonymous 2 described to me in their interview how students acted upon their return to in-person instruction. “I had students the first year, when we came back, they sat together for 3 months, and they would not talk to each other. They would not know each other's names. They just did not want to interact at all” is what they reported regarding their experience during this time. Anonymous 2 also emphasized that this issue in large part was due to the excess use of cellphones in their students from grades 9-12. To expand on the discussion of cellphones, Anonymous 1 described how they believed cellphones in the classroom could alternatively be thought of as a positive device for student use if it was done in a specific manner. They shared during the interview the way in which they conducted lessons which consists of,

> there's a balance at the beginning of a lesson if I'm…if I need their full attention, like I demand that, you know, they put their phones away. But after they've learned the lesson, and they're in the middle of maybe practicing the skills, you know, that were introduced in the lesson, if they have to check their phone, or if they quickly do something on their phone. I don't think that is as detrimental.

They continue describing how educators and students should foster a relationship in which there is compromise on both ends for the ultimate benefit of the students who were impacted the most by lasting effects of online instruction during the pandemic. If teachers and students work together in order to compromise on what needs to be done and what would like to be done, a system can come to fruition where both parties are satisfied with completing work as long as there is some type of reward, or “free choice” being given.

Technology should be available at every school and each student should at least be enrolled in a 1 to 1 device program, if not 1 to 2.

Figure 2 (listed on page 25) of this study shows readers that three out of six teachers responded 'yes' to question #5 of the interview questions, but the remaining three of six teachers had different answers for the primary researcher during their interviews. Despite only three out of six in complete favor of more technology being available in schools, anonymous 3, anonymous 5, and anonymous 6 expressed that they believe technology should be available in schools for students and educators to utilize but should not exceed the 1 to 1 device program under certain conditions. Anonymous 3 claims that there should be a middle ground for device use within instruction time by stating,

> Yeah, I mean, you know, yeah, proper use, right? And I really think they [schools] should cause, it's beneficial, it's needed. They're good tools if they're used effectively."

Anonymous 6 expresses a similar opinion to Anonymous 3's answer by explaining that as a 3rd grade teacher, they can understand why some teachers would agree that more technology is better, but,

> I think it's just as well for them to just have one. They can carry back and forth, because, just like you said, it can teach them responsibility. You know how we care for our devices right? And how we use them as a tool like especially going into upper grades…

With younger students, there really is no need for more than one device since they are just starting to learn what responsibility means and how to care for items that are not our own. During anonymous 5's interview, the primary researcher was told that it depended on whether the school was requiring teachers to assign homework to their students. Because this educator

was reflecting on their K-12 experience with Special Education students, they didn't see the need for an extra device at home. The exception to this belief though, was that,

> And if we're not providing a set device for the home, then it could result in students not having any form of support. And so we know that there's some students that their parents work all day, or there's some students whose parents don't speak English. And so they're not able to get you know support in terms of their homework from family and so having the tech could support them you know watching YouTube videos, watching a recorded lesson, etc., but I think we should be able to offer depending again on being equitable.

An interesting point to this theme the primary researcher discovered was that anonymous 3, anonymous 5, and anonymous 6 work/worked with late elementary and early middle school children. The remaining three educators who responded 'yes' to question 5 all work/worked with students in late middle school and all high school grade levels.

Additional data that was collected and reviewed were the answers provided by participants to the 5 predetermined questions. All participants were asked to elaborate on each of their answers for all interview questions, but 3 of the 5 interview questions had a 'yes/no' component to them and have been attached as a graph below to display the results.

Figure 2

Table: Yes/No frequency to answer interview question #1, #2, & #5

Interview Question:	Do you see technology within the classroom in the form of laptops, digital assignments, using videos and interactive websites, etc., as beneficial to your student's learning styles?	Is this digital type of learning a more useful and approachable tool for yourself and students then when classrooms didn't rely so heavily on technology?	Do you wish schools had more technology available for students to utilize daily, or is it the opposite?
Anonymous 1	Yes	Yes	Yes
Anonymous 2	Yes	Yes	Yes
Anonymous 3	Yes	Yes	Undecided
Anonymous 4	Yes	Undecided	Yes

Anonymous 5	Yes	Yes	Undecided
Anonymous 6	Yes	Yes	Undecided

The remaining two elaborative questions (#3 & #4) were discussed throughout the themes section of this study, but to reiterate on indicators that participation/learning was increasing with the integration of technology include examples such as:

- ◊ Anonymous 3's students getting excited when being offered the choice of completing an assignment on paper or on the provided iPads.
- ◊ Anonymous 1's ability to use websites such as 'No Red Ink', 'Canva', and 'Ed Puzzle' to allow anonymous participation from students who expressed fear of participating in front of classmates.
- ◊ Anonymous 2's integration of websites such as 'Kahoot', and 'Quizlet' to further engage students during lessons and at home as well as utilizing Spanish music played through speakers before class time to practice vocabulary and how to apply this new knowledge.
- ◊ Anonymous 5's observation of increased participation from Special Education students who are utilizing devices to express their needs, wants, and when answering lessons questions.
- ◊ Anonymous 4's observation of school sites using 'i-ready', which integrates electronical 'brain breaks' into the targeted lessons for the day to motivate students to perform well during lesson assessments in order to earn these breaks that consist of short, fun games.
- ◊ Anonymous 6's use of 'gamified' activities to reviews lessons together with 'scholars' as a class. They reported students becoming excited to participate in

these electronic-based games due to seeing their names and placements come up on a projector screen at the front of the class which is based off of their performance in these reviews/assessments.

Indicators that participation/learning was decreasing with the integration of technology include examples such as:

- ◊ Cell phone usage/allowance within classroom environment.
- ◊ Chat GPT/AI use, excessive internet use.
- ◊ Lessons presented in a student's unpreferred learning style(s).
- ◊ Teacher's underuse/overreliance with technology being used during lessons.
    - o Anonymous 5 stated, "I think teachers should be trained and supported on both types of instruction [in-person & online], you know, how we use tech and how we don't, because we saw the impact of not being trained had on teachers when things went full remote learning. And that is one reason students are so behind on their learning now. It's because we weren't prepared to instruct students you know, using tech only. So I think it's important that we are, you know, supporting and training teachers on how to do all modes of instruction".

DISCUSSION

Key Findings

The goal for the primary researcher and faculty mentor when creating the topic for this project was to understand how this new increased integration of technology within K-12 classrooms has been affecting a student's willingness to participate and learn based on the testimonies of experienced K-12 teachers. The team specifically focused on these effects since the COVID 19 pandemic and what teachers have been observing in their classrooms now versus what they experienced pre-pandemic.

The results from this study indicated that technology has changed the way in which students are learning, for better and for worse. As heard through the testimonies of the 6 experienced K-12 educators, students are proving to truly enjoy this new type of equipment in their classrooms to play games, practice grammar, make presentation slides to share with their classmates, and even annotate documents on laptops or tablets, to name a few examples. Students are also learning and practicing vocabulary and pronunciation of words in foreign languages through songs played through speakers before class starts, websites such as 'Quizlet' and 'Kahoot', and simply through videos centered on the lesson being played for the entire class to watch. No longer do teachers feel they need to be available 24/7 to students to answer their questions and provide support for assignments or learned curriculum when they have supplementary videos and assignments that are provided through apps and websites they can access at home and at while at school, especially when an educator or student is absent. This all goes to show the positive impact technology has had on students and educators.

On the other hand, educators also expressed their thoughts on detriments that came from this excessive use of technology within the classroom and its impact on participation/willingness

to learn. It was reported that cellphone use was found to have a negative impact on a student's participation rate and would cause student to lose focus during class time to message friends, view videos, or use social media apps for entertainment. It was also reported that educators whose students possess cellphones found it much harder to keep them on track and wished there was some form of training or procedure in order to remove cellphones from the learning area in order to maintain their student's attention. Student use of websites and apps such as 'Chat GPT' and 'AI' websites were also a big culprit of students completing their assignments, but not being able to retain the learned information and apply it to exams or future assignments without the use of their cellphone or a device. Many students have become dependent on resources like this and instead of positively using them to support their learning, they've turned it into a sort of 'crutch' to lean on in times of need. Anonymous 5 brought up this same concern, but with some educators they observed over implementing the use of technology in their lessons with students since the pandemic and have utilized it as a crutch to rely on instead of figuring out ways to bring back the in-person aspect of instruction.

While analyzing the data in terms of the hypotheses the primary researcher made at the beginning of this study, it was discovered that all educators did not believe technology should be kept at a minimum within the classroom during instructional periods and can be used to increase participation and a student's willingness to learn. The primary researcher also learned throughout the process of the study that device use within a classroom can actively help promote student engagement and increased positive performance on assessments or lessons due to the concept that all students have different preferred learning modes, but it doesn't mean they should only focus on receiving instruction through that mode. It is important to explore and discover what can be utilized as a supplement to refrain from stagnant performance.

The COVID-19 pandemic had a large impact on an educators' and student's experience of working and learning. Many students were encouraged to set a limit on how much technology they would utilize throughout the day since they were also utilizing other devices to complete assignments and projects. It has been recommended by the AAP that screen time does not exceed 2 hours in total for children to avoid conditions such as obesity, sleep problems, depression, and anxiety from developing (Domingues-Montanari, 2017). This is important to keep in mind to ensure that our children and teenagers are healthily developing, but in the face of this pandemic where a transition to online instruction was inevitable, how does that change the allotted screen time when they are using devices for entertainment as well as for 'work'? This is a question that might be able to be answered in another study, but regardless, our students and educators went through a huge change in the way which education is delivered which has shown to be detrimental in some respects, but beneficial in many more ways than before.

Recommendations for teachers

Technology and its slow but sure integration into the classroom setting has been rapidly increasing over the last few years. Thanks to the data that was collected through this study, the primary researcher was able to get a closer look into how technology has been affecting both educators and students in terms of participations rates, performance, and its uncomplicated use for lesson planning and providing supports/supplementary material. The primary researcher encourages teachers to keep the current use of technology in the classroom, especially if they notice that their students will become more inclined to participate during lessons and improve their performance on assessments/assignments. Supplementary websites such as 'Kahoot', 'Quizlet', 'No-red-ink', 'Flipgrid' and many more have helped students speed up the process of reviewing for exams or completing challenging assignments instead of using a support strategy

such as creating their own flash cards. If students have these supports on hand through a device, they will be able to view and utilize them without the help or required presence of an educator. It is also encouraged that teachers keep engaging with their students in a manner that grabs their attention and keeps them entertained. If it means allowing their students to choose a funny video from a highly preferred show or movie to be played in class if they perform well on something such as an assignment or informal assessment, then they are showing that their students' opinions and choices matter, which is what many students feel they need. They feel the need to have some control in their life and that their good actions can bring good consequences. Students don't like to feel as though learning is a chore and if this ideology is internalized, they will not see a reason behind investing in paying attention and learning something as simple as the Pythagorean theorem or the difference between 'their', 'there', and 'they're'.

Educators do not have an easy job by any means. They oversee 20+ students daily, constantly need to plan lessons, and figure out ways in which to bring success to every single one of their students. With this new form of instruction and the increase of technology use within classrooms, they must adapt on short notice and come up with ways in which to engage their students in the lessons all while adhering to any rules and policies put in place. Technology has its own place within the classroom and can bring many benefits with its integration, but we must remember that it is indeed a privilege as much as a weapon.

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